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THE PLANT DISEASE REPORTER

Issued By

Division of Mycology and Disease Survey

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The Plant Disease Reporter is issued as a service to plant pathologists throughout the United States. It contains reports, summaries, observations, and comments submitted voluntarily by qualified observers. These reports often are in the form of suggestions, queries, and opinions, frequently purely tentative, offered for consideration or discussion rather than as matters of established fact. In accepting and publishing this material the Division of Mycology and Disease Survey serves merely as an informational clearing house. It does not assume responsibility for the subject matter.

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THE PLANT DISEASE SURVEY

DIVISION OF MYCOLOGY AND DISEASE SURVEY

Volume XXIII Number 22

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IN THIS ISSUE

As the first of a series of studies projected as a basis for the preparation of an index of viruses and virus diseases occurring in this country, Freeman Weiss has constructed a tentative key to typical viruses of leguminous crops, page 352, which it is hoped will serve as a starting point for discussions leading to an acceptable standard of virus nomenclature in the United States.

G. R. Hoerner contributes an article on the relation of the climatology of Western Oregon to the incidence and control of downy mildew on hops, page 361.

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Tobacco black shank was discovered for the first time in Virginia this year, according to S. A. Wingard, page 369.

First occurrences or discoveries more briefly reported, page 370, include bacterial ring rot of potato in Iowa, by J. H. Standen; take-all of wheat in Delaware, by T. F. Manns and R. J. Haskell; and Ganoderma associated with a root rot of Coluteа in Oklahoma, reported by L. F. Locke, with the fungus determination by Ross W. Davidson.

E. M. Hildebrand sends a report on the "X-Disease Clinic" held in New York during August, page 371.

Announcement of Plant Disease Survey Conference at the Columbus meeting, page 372.

A KEY TO THE TYPICAL VIRUSES OF LEGUMINOUS CROPS[1/]

Freeman Weiss

Some 50 articles reporting studies on the symptoms, host range, transmission and properties of viruses affecting leguminous crop plants in the United States have appeared in phytopathological literature in this country. At least 24 viruses or virus strains believed to be different have been described as affecting hosts within this group. Despite several attempts to coordinate the virus descriptions, and reduce to a minimum the number of different virus entities, by Pierce (7), Zaumeyer (5, 6), and Smith (20), the students of legume viruses have differed widely in their understanding of each others' material, and there is at present no account in which all the legume viruses that have been recorded in the United States are classified according to one system.

In virus nomenclature, the modification of Johnson's (9) system proposed by Smith (20) is meeting wide though not universal favor. In this system the viruses are named from the "first described or most important host plant," using the Latin generic name of the host; they are numbered in the chronological order of their first published descriptions--a method which admittedly does not associate related or similar viruses but which has the advantage of simplicity and easy application. Smith does not specifically designate the source of the type description, and his selection of authorities for the formal virus names does not appear to follow consistently the rule of priority but represents the exercise of some personal judgment; likewise, the selection of the "most important host." If Smith's Plant Virus Diseases could by international agreement be accepted as a sort of Species Plantarum for virus nomenclature, the appropriate "generic" reallocations, transfers to synonymy, and additions of new names would present no difficulties that progressive research could not overcome, but even tentative agreement on virus names does not seem likely to be achieved in the near future.

Pending the adoption of international rules of nomenclature for plant viruses, and in order to systematize the records of occurrence of virus diseases in the United States, the Plant Disease Survey is attempting the preparation of an index of viruses and a host index of virus diseases reported to occur in this country. As a tentative basis, the classification and nomenclature proposed by Smith is being followed, but with departures therefrom when in the judgment of the virus specialists who are consulted, and of the Survey staff, such variations are justified. It is hoped, with the collaboration of students of the virus diseases, to build up

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[1/] This is the first of a series of projected studies which will deal with the identity, host range, differentiation, and classification of viruses affecting crop plants in the United States, as a basis for the preparation and the maintenance in the Plant Disease Survey of an index of viruses and of virus diseases.

a system of virus nomenclature that may be widely acceptable as a standard in the United States, making broad provision for the designation of synonyms and common names, and for flexibility of revision as the progress of knowledge in this field warrants.

The major principles tentatively adopted for guidance are:

1. The formal virus name shall consist of (a) the Latin generic name of the first described and/or most important host plant; (b) an Arabic numeral indicating its chronological order in the discovery and formal description of the viruses which especially affect this host; (c) the name of the author of the type description, e. g., Phaseolus Virus 2, Pierce.

2. In the case of polyphagous viruses the selection of "the most important" host will sometimes be arbitrary, as consideration should be given not only to the economic importance of the host but also to the extent of distribution and frequency of occurrence of the virus.

3. The designation of a "type description" involves special difficulties, particularly with viruses on which an extensive literature grew up before systematic descriptions of virus properties, as now employed by most authors, were begun. The procedure here will be to use the name of the author(s) who first showed the virus nature of the disease in question, by (a) the exclusion of other potential causes and (b) the transmission of the virus to appropriate healthy hosts. A specific literature citation to the type description will always be given. The designation of the authority will, therefore, provided the description is precise and complete enough for recognition, be based solely on priority, and no implication of any other appraisal of the paper as a contribution to the knowledge of this virus is intended.

4. Following the formal name, the preferred common name will be given; this will ordinarily be in some degree descriptive. There will be as complete a list of synonyms used in the United States as available information permits.

5. Distinctive virus strains differing from the type in host range, in symptoms induced on differential hosts, and in properties, will be designated by a capital letter (A, B, etc.) following the number. They will bear the name of the author and a citation of the type description, and may have a common name, e. g., Pisum Virus 2A, Stubbs (pea mild mosaic virus).

6. The formal names of viruses which are shown by work subsequent to their original publication to be identical with a previously identified virus will be transferred to synonymy, though a distinctive common name may be retained, e. g., southern celery mosaic = Cucumis Virus 1, Doolittle (Celery Virus 1, Wellman).

7. In applying names to virus diseases, the frequent existence of complex virus infections must be recognized by the use of common names which do not correspond with any single formal name, but the correspondence with plural viruses can be indicated when these are identifiable.

The viroses of leguminous crops were selected as a starting point in this project because some confusion in their identification and nomenclature has already occurred, but it has not attained the complexity of the potato and tobacco virus problems. This example will illustrate the methods and the objectives of the project, and it is hoped that it will serve as a basis for discussions between the Survey staff and virus specialists as to further procedure in the construction of this index. The opinions of collaborators and of all persons interested in this subject are invited.

Key to Typical Viruses of Beans, Peas, Clovers and Alfalfa[1/,2/,3/]

A. Infectious to pea (most varieties); noninfectious to bean

B. Producing leaf enations on peas . . . Pisum Virus 1, Osborn (11) (pea enation mosaic virus)

BB. Not producing leaf enations on peas

C. Infectious to Horal and Perfection peas and to white clover

D. Causing vein clearing in these hosts . . . . . Trifolium Virus 2, Osborn (14) (red clover vein-mosaic virus)

DD. Causing a streak or necrotic disease in these hosts . . . Pisum Virus 5, Zaumeyer (25) (pea streak virus)

CC. Noninfectious to Horal and Perfection peas and to white clover

D. Infectious to red clover and white sweetclover . . . . Pisum Virus 2, Doolittle & Jones (3) (common pea mosaic, red clover mosaic virus)

DD. Noninfectious to red clover and white sweetclover

E. Obscure mottle in Alaska (and other) peas . . . . . Pisum Virus 2A, Stubbs (22) (pea mild mosaic virus)

EE. Conspicuous mottle in Alaska (and other) peas

F. Chlorotic areas large, with leaf distortion . Pisum Virus 2B, Stubbs (22) (pea marble mosaic virus)

FF. Chlorotic areas small, no leaf distortion . . Pisum Virus 2C, Stubbs (22) (pea speckle mosaic virus)

AA. Infectious to beans (except certain varieties)

B. Infectious to white clover

C. Systemic infection in this host

D. Noninfectious to soybean . . . Trifolium Virus 1, Zaum. & Wade (28)
(white clover mosaic virus)

DD. Infectious to soybean

E. Infectious to sweet pea . . Medicago Virus 1A, Zaum. (25)

EE. Noninfectious to sweet pea

F. Infectious to cucumber . Medicago Virus 1B, Zaum. (25)

FF. Noninfectious to cucumber . . . . . Medicago Virus 1, Weimer (23)
(alfalfa mosaic virus)

CC. Local lesions on white clover . . . . . Pisum Virus 3, Chamberlain (1)
(pea streak virus)

BB. Noninfectious to white clover

C. Infectious to tobacco

D. Producing local necrotic lesions on bean leaves[4] . . Nicotiana Virus 1, Johnson
(ordinary tobacco mosaic virus)

DD. Producing local and systemic necrotic lesions on bean leaves . . . . . Nicotiana Virus 12, Wing. & Hend.
(tobacco ringspot virus)

CC. Noninfectious to tobacco

D. Noninfectious to peas . . . . Phaseolus Virus 1, Stew. & Red. (21)
(common bean mosaic virus)

DD. Infectious to peas

E. Infectious to red clover

F. Infectious to Great Northern U. I. No. 1 bean . . . . . Phaseolus Virus 2, Pierce (16)
(yellow bean mosaic, white sweet clover mosaic virus)

FF. Noninfectious to Great Northern U. I. No. 1 bean

G. Infectious to Corbett Refugee bean . . . . Pisum Virus 4, Osborn (12) (pea virus 2, Osborn)

GG. Noninfectious to Corbett Refugee bean . . . . . Pisum Virus 4A, Zaumeyer (26) (pea virus 4)

EE. Noninfectious to red clover

F. Noninfectious to alsike clover (infectious to Great Northern U. I. No. 1 bean) . . . . . Pisum Virus 6, Zaumeyer (26) (pea virus 5)

FF. Infectious to alsike clover (noninfectious to Great Northern U. I. No. 1 bean)

G. Producing systemic mottle in peas, with little or no distortion . . . . . Trifolium Virus 3, Zaumeyer (26) (alsike clover mosaic virus 1)

GG. Producing marked stunting without mottle in peas . . Trifolium Virus 3A, Zaumeyer (26) (alsike clover mosaic virus 2)

Footnotes to key:

1/ The following viruses, although infectious to certain leguminous plants and sometimes occurring naturally on them, are not "typical legume viruses"; means of distinguishing them from the viruses of the key are indicated.

Curly top (Beta Virus 1) on beans -- symptoms distinct from any of the included viruses; not mechanically transmissible or only difficultly so.

Spotted wilt (Lycopersicon Virus 3) on peas (Snyder & Thomas, Hilgardia 10: 255. 1936; Whipple, Phytopath. 26: 918. 1936) -- symptoms resemble those of pea streak (Pisum Virus 5) but this virus is not transmissible to beans and not transmissible by aphids. The pea streak described by Linford in Hawaii (Phytopath. 21: 999. 1931) as caused by the pineapple yellow spot virus appears to be closely related.

Cucumber mosaic (Cucumis Virus 1, several strains) on beans and peas (Whipple & Walker, Phytopath. 28: 22. 1938); on peas (Zaumeyer, Phytopath. 29: 25. 1939); on lima beans (Harter, Phytopath. 26: 94. 1936); on cowpea, Strain 1C (Price, Phytopath. 24: 742. 1934) -- present information regarding importance on legumes and relation, if any, to the pea streak and alfalfa mosaic viruses is inadequate for appropriate discussion here; separable from other legume viruses by wide host range outside the Leguminosae.

Potato yellow dwarf (Solanum Virus 16) on Trifolium spp. (Black, Cornell Agr. Exp. Sta. Mem. 209. 1937) -- symptoms differ from clover mosaics; not transmissible mechanically or by aphids.

2/ The following legume viruses are omitted from the key either because of distinctive characteristics permitting their identification without resort to analytic key methods, or because of insufficient information about their hosts, means of transmission, and properties.

(1) Alfalfa dwarf (Medicago Virus 3, Weimer [24]) -- restricted to alfalfa; transmissible only by graftage.

(2) Bean mosaic virus 3 (Phaseolus Virus 3, Zaumeyer & Wade [28]) -- unidentified virus.

(3) Cowpea mosaic (numerous reports to P.D.S. from southern U. S.) -- unidentified virus.

(4) Crotalaria mosaic (Johnson & LeFebvre, Phytopath. 28: 10. 1938) -- unidentified virus.

(5) Soybean mosaic (Soja Virus 1, Gard. & Kendr. [6]) -- noninfectious to peas and beans, occurring only on soybeans, in which it is seed-transmissible.

(6) A virus obtained from red clover which produces local lesions on Vicia faba var. minor by Pierce (17); unidentified virus. Zaumeyer suggested (25) that this may be a strain of the pea streak virus.

(7) Mild mosaic virus of broad bean (Vicia faba) described in China by Yu (Phytopath. 29: 448. 1939).

3/ The two Nicotiana viruses, ordinary tobacco mosaic and tobacco ringspot (sweet clover ringspot), are included because the production of local lesions on beans by the first-named is a commonly employed diagnostic test, and the latter is a virus of frequent natural occurrence on sweet clover in the Middle Atlantic States.

4/ Var. Scotia, at 23-33° C. under greenhouse conditions, using primary leaves of young plants.

Notes on the Interpretation of the Key

In general, the viruses grouped under "A" are pea viruses (mosaics and streaks); those grouped under "AA" are infectious both to peas and beans, although only two have been recorded as occurring naturally on beans. Throughout the key an attempt is made, though not always successfully, to place viruses of similar properties together in the major subdivisions.

Pisum Virus 1, originally designated "pea mosaic virus" by Osborn (11), and "pea virus 1" or "enation pea mosaic" by Stubbs (22) and Pierce (17), is readily distinguished from all other pea viruses by the production of enations on the under leaf surface of pea and crimson clover.

Pisum Virus 2, Doolittle and Jones (3), antedates Pisum Virus 1 and should logically precede it in numerical order, but Smith's numbering sequence is retained to avoid further confusion. Its probable correspondence with the common pea mosaic (pea mosaic virus 1) and the red clover mosaic of Zaumeyer and Wade (29), and also with the common pea mosaic (pea virus 3) of Pierce (17), has been suggested by several authors. The pea viruses designated "2A", "2B", and "2C" by Stubbs (22) also are closely related to it. However, pea virus 2, Osborn, is not synonymous, though listed so by Smith, nor is pea mosaic virus 2, Zaumeyer and Wade, since both belong to the bean-infecting pea viruses. The severe pea mosaic described by Johnson and Jones (8), and considered by them to be similar to pea virus 3, Pierce, and to white sweet clover mosaic virus of Zaumeyer and Wade, can not be precisely allocated here; it belongs to the bean-infecting pea viruses and, therefore, is not closely related to pea virus 3, Pierce. The identity of the pea mosaic virus described by Dickson (2) seems too uncertain to warrant its designation as the type of a virus description, though it antedates the pea mosaic virus of Doolittle and Jones.

The name "Pisum Virus 4" is suggested for Osborn's pea virus 2, which was named in 1935 and described in 1937 (12). Although it antedates Pisum Virus 3, applied to a pea streak by Chamberlain (1), the latter was the first to apply this formal name. To avoid confusion, Osborn's virus is designated by the next higher number. As Zaumeyer's pea virus 4 (26) has nearly identical properties, it is designated as a strain of Pisum Virus 4. Both of these viruses may prove to be similar enough to Phaseolus Virus 2 to be designated as strains thereof.

Pea streak virus 1 described by Zaumeyer (25) also antedates Chamberlain's pea streak virus, from which it appears to be distinct, but since the name Pisum Virus 3 is preempted, this is given the number "5" for the purpose of this key. Pea virus 5 of the same author (26) appears distinct enough from the other pea viruses that infect beans to receive a formal name, and, following chronological order, is designated "Pisum Virus 6". These designations are made with the approval of the author. Chamberlain's pea streak virus is noteworthy among all the legume viruses in this key in being noninfectious to Vicia faba.

Trifolium Virus 1 (white clover mosaic) is credited on the principle of priority of publication to Zaumeyer and Wade (28) instead of to Pierce (17) as in the Smith system. The former authors identified the disease by this name, and showed that the virus was transmissible to beans, in 1933; their published description of its symptoms on white clover and other hosts, and of its properties, appeared in October 1935; Pierce's independent study of this virus was published in December 1935.

Trifolium Virus 2 (vein-mosaic of red clover) is the only virus among those recorded on legumes which causes a definite veinal mosaic without necrosis or general mottle.

Mosaic diseases of alfalfa, based on different material, were described by Weimer (23) and by Pierce (16). The latter applied the name "alfalfa virus 1" to Weimer's virus, and "alfalfa virus 2" to his own. In the Smith system these became respectively "Medicago Virus 1" and "Medicago Virus 2". Zaumeyer (25) concluded that alfalfa viruses 1 and 2 are essentially alike and combined them under the name "alfalfa virus 1", but he differentiated two strains of the virus on the basis of symptoms induced in peas and other hosts, and of properties.

The common bean mosaic virus (Phaseolus Virus 1) has been identified without confusion by all students of this group, the symptoms on beans and transmission through seed distinguishing it from yellow bean mosaic virus (Phaseolus Virus 2). On the principle of priority, however, the description of this virus should be credited to Stewart and Reddick (18) instead of to Pierce (16) as is done by Smith. The former authors recognized the disease as of virus origin, and showed the virus was transmissible by sap inoculation and through the seed in 1917-19. Some of Fajardo's work (4, 5) on this virus also antedated that of Pierce, whose comprehensive account of it (with Hungerford) was published in 1929.

The identity of the white sweet clover mosaic virus (and also pea mosaic virus 2) of Zaumeyer and Wade (28) with the yellow bean mosaic virus (Phaseolus Virus 2, Pierce) has been generally accepted. The transmission of this virus to beans was reported by Zaumeyer and Wade in 1933, but a full description of the virus was first given by Pierce in 1934. This is a common and widely distributed virus in sweet clover, in which host it can survive from one year to another, whereas in beans, since it is not seed-borne, it must be annually introduced. A question is thus raised as to which is the "first described or most important host plant". Since the name "yellow bean mosaic" is well established in literature, and since "Phaseolus Virus 2" expresses the relationship to this host, no change in the formal name is here suggested, but this virus might well bear two common names, the second of which would be "sweet clover mosaic virus".

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(Division of Mycology and Disease Survey, U. S. Bureau of Plant Industry).

THE RELATION OF THE CLIMATOLOGY OF WESTERN OREGON TO THE INCIDENCE AND CONTROL OF DOWNY MILDEW OF HOPS

G. R. Hoerner

Downy mildew [Pseudoperonospora humuli] of hops was first authentically determined as being present in Oregon in 1930. Infected shoots, known as "spikes" were found on April 10 of that year at Mt. Angel in Marion County. The disease has been present in Oregon each year since its first appearance and has been reported from every hop-growing county in the western part of the State.

A chronological record of the annual first appearances of the disease is presented herewith:

Year	Seedling Infection	Spikes
1930		April 10
1931		March 10
1932	March 15	February 4
1933	March 14	April 3
1934	January 20	February 21
1935	March 2	April 9
1936		March 1
1937	March 29	February 19
1938		April 2

The dependence of the incidence of infection of downy mildew upon the existence of weather conditions conducive to its development and spread is generally recognized. Comparatively low temperature and high relative humidity are usually favorable to spore production and germination and infection

of hop plants by the fungus. Once infection has taken place, higher temperatures and other weather conditions favorable to rapid growth of the hop vines also favor rapid development of the disease-producing organism.

A post-season analysis of available climatological data, particularly wind direction, temperature, precipitation, and relative humidity, correlated with the seasonal development and relative varietal susceptibility of the hop plants infected, serves fairly well to explain the development and spread of the fungus and the extent of the commercial damage to the hop crop it occasioned.

Generalizations are apt to be misleading, however, because of highly variable localized conditions that may favor or inhibit infection.

Recognition of this situation is important particularly in attempting to evaluate the comparative resistance to the disease of hop varieties and individual plants developed by selection or hybridization. Individual plants in the experimental breeding yard at Corvallis which had appeared to be highly resistant to natural infection for a number of consecutive years proved to be highly susceptible in seasons when the disease became established in epidemic proportions.

Repeated field observations indicate that the hop downy mildew is spread in the direction of prevailing winds. This may account for the appearance of the disease in widely separated hop-growing areas where no evidence is available to indicate any other means of introduction. Limited attempts to trap the spores in airplane flights at altitudes up to 9000 feet, however, have not been successful.

Experimental evidence is not conclusive that the fungus mycelium is systemic in perennial portions of infected hop plants. Early-season infections, resulting in the formation of "spiked" shoots arising from apparently healthy crowns, have been attributed to the overwintering of oospores within infected hop-plant residue in the soil.

Control measures advocated have, in consequence, been directed toward suppression of early-season infection by means of chemical sterilization of the soil in the immediate vicinity of the crowns and the protection of the developing plants by means of fungicidal dusts or sprays and suitable spreaders.

The extremely rapid growth of hop plants makes it practically impossible to maintain a uniform and complete coverage with any fungicide. The number of applications attempted during the season must, because of time required and costs involved, especially in large plantings, be minimized. Any general attempt to advocate definite timing of sprays or dusts is wellnigh impossible because of variable conditions of growth and environmental factors from season to season, from yard to yard, and even in different areas of individual yards.

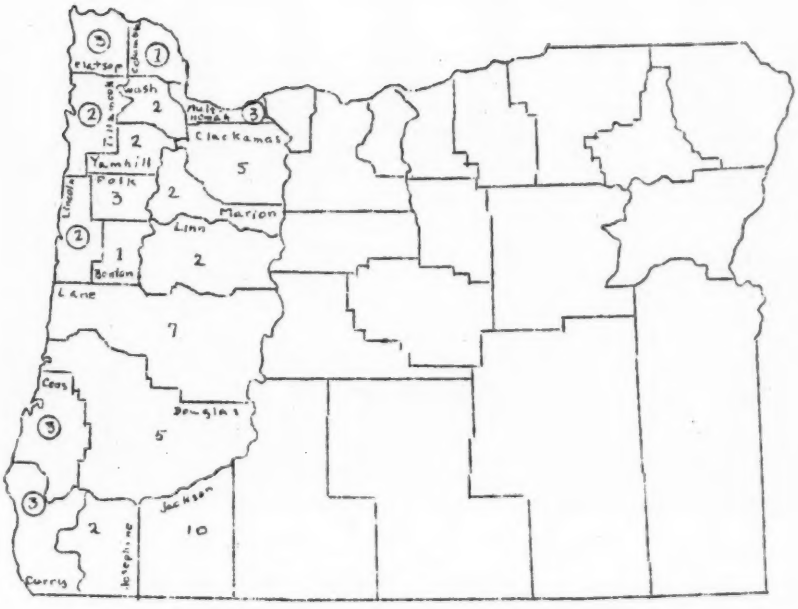

Fig. 1. Outline map of Oregon showing number of weather reporting stations in western Oregon counties from which data were secured.

It was thought, however, that by summarizing climatological data as made available for the Oregon Section, Western Division, by the U. S. D. A. Weather Bureau, generalizations might be drawn which would serve to indicate to growers periods of the growing season most apt to be accompanied by "mildew weather" and during which control measures with fungicides should be concentrated.

In Figure 1, an outline map of Oregon is presented in which the number of stations in each county, from which data were available, is shown. The figures surrounded by a circle indicate counties in which no hops are grown.

It should be borne in mind, however, that some of the stations in hop-growing counties were located in areas outside hop-growing districts.

Daily reports of maximum and minimum temperatures and rainfall were tabulated, for the years 1929 to 1938 inclusive, from 58 stations in 18 counties in western Oregon, including data from 17 stations in 7 non-hop-growing counties. Unfortunately, data on relative humidity were so fragmentary that this important item could not be included in the tabulations.

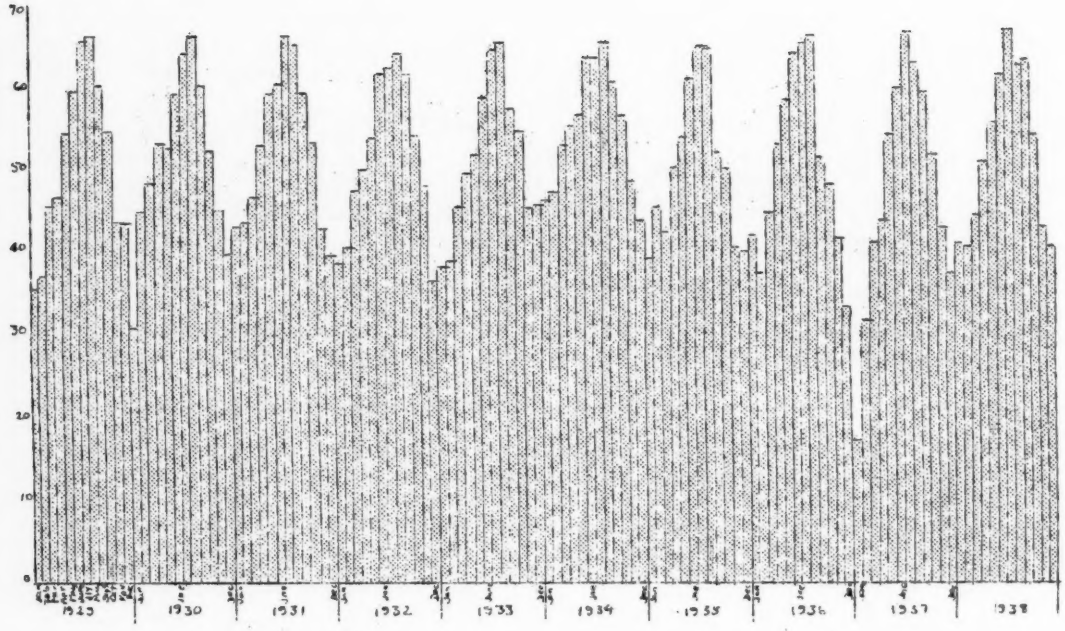

Fig. 2. Monthly mean temperature, Oregon, Western Division, 1929 to 1938. Comparisons by years.

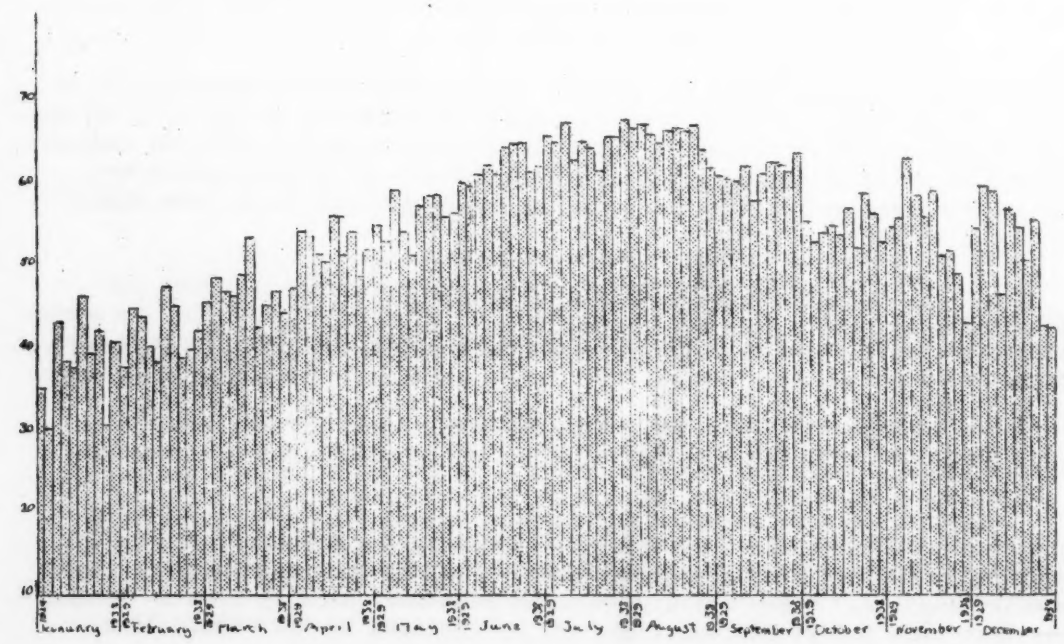

Fig. 3. Monthly mean temperature, Oregon, Western Division, 1929 to 1938. Comparisons by months.

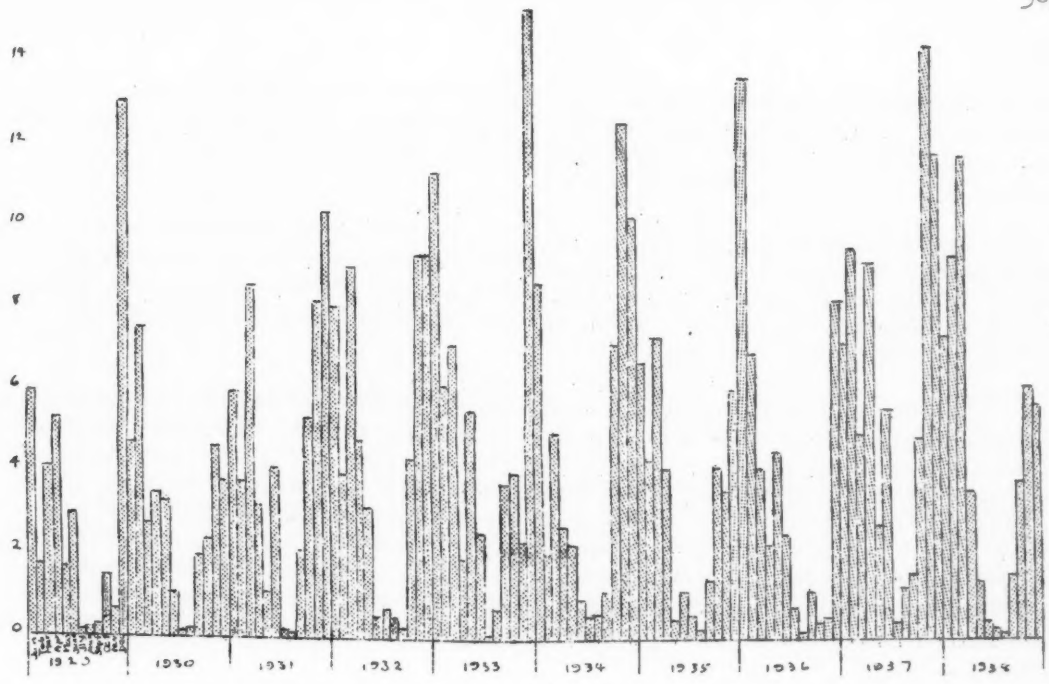

Fig. 4. Monthly mean rainfall, Oregon, Western Division, 1929 to 1938. Comparisons by years.

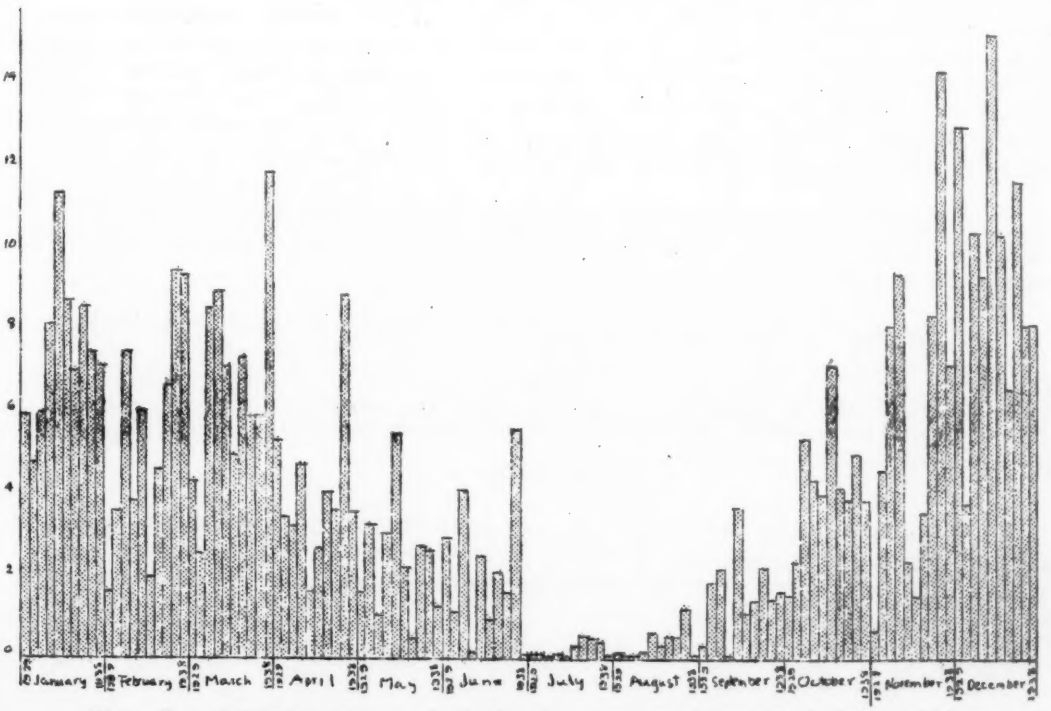

Fig. 5. Monthly mean rainfall, Oregon, Western Division, 1929 to 1938. Comparisons by months.

Daily averages of maximum and minimum temperatures and rainfall were then calculated. From these daily averages, graphs were prepared showing monthly mean temperature, in degrees Fahrenheit, and monthly mean rainfall, in inches, as indicated in Figures 2 to 5.

The monthly mean temperature was not particularly unfavorable to downy mildew spore germination at any time during the growing seasons of any of the 10 years under review. In fact, if hop vines continued in active growth throughout the winter, downy mildew infection would doubtless be continuous throughout the year.

The monthly mean rainfall is much more variable than the temperature and, considered along with the relative humidity, is probably more directly responsible for the extent of downy mildew infection during the growing season. While the months of July and August show the minimum amounts of rainfall, the variations in the monthly mean rainfall during the growing season are so variable from year to year that it would be futile to attempt to develop an accurately timed spraying or dusting program based on past records of rainfall or upon an unpredictable future precipitation, which involves not only the factor of actual rainfall but the highly important consideration of relative humidity.

Growers who contemplate an attempt to control downy mildew should concentrate their efforts early in the season, previous to July 1. If downy mildew infection in their yards can be held to a minimum up to that time the probability of serious damage later in the season should be much less. Fungicidal applications are intended to serve as a protection against infection and not as a cure after infection has already taken place. Fungicidal sprays or dusts, therefore, should be applied with the idea of securing as complete coverage as possible and so timed as to precede rather than follow periods of high relative humidity or rainfall.

Of necessity, each grower will have to determine for himself what his control program will be and modify that program from year to year as local conditions and past experience require.

(Division of Drug and Related Plants, Bureau of Plant Industry).

OBSERVATIONS OF FLAX DISEASES IN 1939

A. C. Dillman

While observing the flax varietal experiments at several State agricultural experiment stations during July and August 1939, notes were taken on flax diseases where they occurred in experimental plots or in commercial fields.

In Neosho County, southeastern Kansas, flax wilt (Fusarium lini) caused serious loss in a field of Redwing flax. The field had been cropped to Redwing flax in 1938, when a good yield was obtained, and the grower had replanted the field in 1939 with the same variety. Flax wilt was prevalent in many parts of the field and the yield was reduced materially. It is well known that Redwing is not nearly so wilt-resistant as the Bison variety and, therefore, where flax is grown continuously or in short rotations, the Bison variety should be used.

At Moran, Allen County, Kansas, no diseases of flax were observed. At Manhattan, flax rust (Melampsora lini) was fairly abundant on susceptible varieties.

At Kanawha, Hancock County, Iowa, on July 8, no rust, pasmo, or wilt was found on flax in the varietal experiments including some 30 varieties. Later in the season, however, according to L. C. Burnett, who had charge of the varietal experiments, pasmo occurred to a limited extent.

At University Farm, St. Paul, Minnesota, flax rust was observed July 9, and was very abundant on susceptible varieties a month later. A severe epidemic of pasmo (Phlyctaena linicola Speg.) [Septoria linicola (Speg.) Garassini, Sphaerella linorum Woll.] developed there during July, and the disease was almost equally prevalent on all varieties, with one exception, in early August. This was by far the most severe infection of pasmo ever observed by the writer. Only one variety (C.I. 975), a hybrid of Bison x C.I. 479, developed by Prof. A. C. Arny, appeared to be somewhat resistant to the disease. The main stems were relatively free from infection, but the panicle branches were more or less infected. In spots where plants were broken down or lodged, the main stems were also infected, so that probably no high degree of resistance can be expected in this variety. It is notable, however, that the variety could be easily distinguished by its relative freedom from pasmo in both field and nursery plots in random plantings.

At Bozeman, Montana, no flax diseases were observed, with the exception of a trace of heat canker in a single row of flax that was sown in mid-June. A collection of flax rust was made on plants of Linum lewisii. The collection was made on plants found at the base of the mountain bearing the letter "M" in the Bridger range northeast of Bozeman, at an altitude of about 5,500 feet. Rust was very abundant on a few plants, although other plants only a few feet away were entirely free from rust. No common flax is grown in the vicinity.

The flax varietal experiments at Pullman, Washington, Moscow, Idaho, Pendleton, Oregon, and Aberdeen, Idaho, were entirely free of flax diseases so far as observed by the writer.

(Division of Cereal Crops and Diseases, Bureau of Plant Industry).

PHAEOCRYPTOPUS GÄUMANNI ON DOUGLAS FIR IN CONNECTICUT

Florence A. McCormick

On January 26, 1938, A. de Caprio, of the Department of Entomology, collected specimens of a fungus on Douglas fir from East Willington. The writer tentatively identified the fungus as a species of Rhizosphaera, but Dr. J. S. Boyce determined it as Adelopus gäumanni Rohde (Adelopus balsamicola [Peck] Theiss., Phaeocryptopus gäumanni [Rohde] Pet.). Dr. Boyce sent some of the material to Dr. Theo Rohde and also to Dr. H. W. Wollenweber, who verified his determination. Later, mature spores proved the fungus to be an ascomycete.

Phaeocryptopus gäumanni (Rohde) Pet. is now known to have been in Connecticut prior to 1929. Recently among some miscellaneous collections a packet of Douglas fir was found. It was labeled by the writer as having been obtained from an estate in Salisbury, Connecticut, and dated July 31, 1929. In this collection the 1928 needles are found to be infected with the now familiar Phaeocryptopus gäumanni. The records show that the writer made cultures from this collection and reported the results as an "undetermined fungus" but "suspicious". The term "suspicious" is used when an uncommon fungus repeatedly occurs in the culture.

The files of April and May, 1929, contain two letters written by the superintendent of the Salisbury estate and on each date he sent specimens of the Douglas fir. In his first letter the superintendent stated that the trees at that time were 8 or 9 years old and, as the trouble became apparent shortly after he had sprayed some nearby deciduous trees, he thought the injury to the firs was due to some of the spray having fallen on them. In his replies to both letters Dr. Clinton noted the presence of a fungus, but since he could find no record of such a parasite on this host he believed it to be secondary. The writer also made cultures of both collections and recorded the results as "failed". Since the 3 attempts to culture the fungus gave nothing resembling the one on the needles, the cultures were finally destroyed and the study of these Douglas firs was forgotten.

On November 15, 1939, Dr. Alma Waterman, of the U. S. Bureau of Plant Industry, and the writer visited the Salisbury estate and talked with the superintendent who had sent the material in 1929. He still believed the trouble with the firs was due to spray injury but he also said that several of his trees had died. We found the trees standing badly infected, and some of the trees across the road from the house are nearly dead. From the writer's experience it is known that a spray may cause Douglas fir needles infected by this fungus to fall readily, thus giving the impression that the primary injury is due to the spray. Apparently, the fungus acts slowly in bringing about the actual death of the tree but it produces a yellowish color and causes heavy defoliation. The evidence indicates that the trees may linger in this condition for a number of years.

In addition to Salisbury, Phaeocryptopus gäumanni has now been found in Taconic, Lakeville, Sharon, and East Willington, Connecticut. No doubt the fungus is widespread in the northern part of the State, but it has not yet been located in the southern part.

(Connecticut Agricultural Experiment Station).

DISCOVERY OF TOBACCO BLACK SHANK IN VIRGINIA

S. A. Wingard

The first authentic case of tobacco black shank (Phytophthora [parasitica] nicotianae) was found in Virginia during the latter part of the 1939 growing season. On July 19, 1939, Dr. J. A. Pinckard at the Chatham Tobacco Station received a letter with a specimen of diseased tobacco from Mr. C. L. Hall, County Agent in Halifax County. The specimen was sent to Dr. F. A. Wolf of Duke University, who identified the disease as black shank.

It was later learned that the black-shank specimen had come from a farm at Buffalo Junction in Mecklenburg County on July 15. Another specimen from the same field had apparently been collected at the same time and taken to the Tobacco Station at Oxford, North Carolina, where it was identified as black shank by Dr. R. F. Poole.

On July 14, 1939, Mr. M. C. Hillsman, Agricultural Teacher at Nathalie, Virginia, sent to Blacksburg diseased tobacco plants from a farm at Nathalie in Halifax County. Mr. R. G. Henderson found some of the plants to be affected with Granville wilt [Bacterium solanacearum] but some of the others showed symptoms suggesting either sore shin or black shank. The causal fungus was isolated by Mr. Henderson and later definitely identified as Phytophthora nicotianae. Mr. Henderson visited this field on August 25 and found that there had been a severe loss of tobacco from some disease in a small area in the field in 1938. The field had been plowed in the fall of 1938 and seeded to peas, which were followed by tobacco in 1939. There was a severe loss in this field in 1939 from black shank. There had been a general spread of the disease in the direction of cultivation, apparently due to plowing through the infested area. The grower stated that he had never brought in plants from other farms. His field was subject to drainage water from a sand-clay road above and it is possible that the inoculum came from the road, though we have no proof of this.

On August 15, Mr. R. G. Henderson, Mr. S. P. Fenne, Mr. James Bullock, Dr. E. E. Clayton, and Mr. C. L. Hall visited the farm at Buffalo Junction to check up on the black-shank outbreak in that locality. They found that the black-shank inoculum had apparently been brought in from the farm of a neighbor, who in 1937 had purchased tobacco seedlings from a man near

Winterville, North Carolina, where black shank is known to be prevalent. The diseased tobacco field was flooded by water from a small stream draining the farm on which the introduced black-shank-affected tobacco was grown in 1937.

Black shank was observed on a farm at Virgilina, Halifax County, August 4 and 15, 1939. It was learned that the grower had obtained his tobacco plants from the plantbed on the Buffalo Junction farm, which apparently had been contaminated with Phytophthora nicotianae by workmen carrying infested soil on their shoes from the black-shank-infested tobacco field bordering the drainage ditch referred to above. The Virgilina field was visited by Mr. L. Bozovaisky of the Chatham Station on August 4 and he estimated that 60 percent of the 25,000 plants were infected and that there would probably be a 75 percent loss. However, the observation on August 15 revealed that the loss had been restricted to an area of about 20 rows wide across the field, with a few affected plants scattered at random over the entire field. There was almost a total loss of crop in the severely infested area but this comprised only about 25 percent of the field.

(Virginia Agricultural Experiment Station. November 19).

BRIEF NOTES ON SOME DISEASES NEWLY REPORTED FROM VARIOUS LOCALITIES

BACTERIAL RING ROT OF POTATO REPORTED FROM IOWA: We had trouble in Iowa in 1938 that looked suspiciously like bacterial ring rot caused by Bacterium sepedonicum, but we were unable to get fresh material to identify the organism. However, the disease was discovered and fully identified in one field in Iowa in 1939.

A fairly exhaustive survey of potato-producing regions in the State failed to reveal other infestations. The one field found infested was near Britt, Iowa, in the heart of the biggest producing area. (J. H. Standen, Iowa State College of Agriculture. November 16).

TAKE-ALL OF WHEAT REPORTED FROM DELAWARE: Take-all caused by Ophiobolus graminis was found by the writers in a field of Leaps Prolific wheat near Mt. Pleasant, Delaware, June 14, 1939. Several definite circular spots about 20 feet in diameter where the plants had died prematurely were observed in the field.

The roots were decayed and the dead heads overrun and blackened with saprophytic molds. Mycelial plates characteristic of Ophiobolus were noted under the leaf sheaths above the crowns but no perithecia were evident with the hand lens. However, specimens referred to A. G. Johnson and examined microscopically by C. H. Ficke and Hurley Fellows later revealed a few typical perithecia of Ophiobolus graminis.

Although this disease occurs in neighboring States, this appears to be the first time that it has been authentically reported from Delaware. Specimens are on file in the herbarium of the Division of Mycology and Plant Disease Survey, Bureau of Plant Industry. (T. F. Manns, Delaware Agricultural Experiment Station, and R. J. Haskell, U. S. Extension Service).

GANODERMA CAUSING ROOT ROT OF COLUTEA IN OKLAHOMA: Mr. L. F. Locke, Associate Horticulturist of the Division of Dry Land Agriculture, at the Southern Great Plains Field Station, Woodward, Oklahoma, sent a root section taken from a plant of Colutea arborescens that had recently died, with the comment, "Several plants of this species have wilted suddenly and within a few days were apparently dead. All of the plants examined so far show the same condition as the accompanying specimen. Mr. [E. W.] Johnson advises me that this condition has been found, in a few instances, in some of our cooperative plantings as well as here at the Station."

The fungus involved was determined by Mr. Ross W. Davidson of the Division of Forest Pathology to be a species of Ganoderma. The finding of this fungus in association with the severe root rot reported by Mr. Locke is of special interest in view of the known destructiveness of members of the genus as a cause of root rot of important economic hosts in various tropical countries.

X-DISEASE CLINIC

E. M. Hildebrand

Plant pathologists from several States met at Hudson, New York, on August 3, 1939, to attend a clinic on the new Yellow-red or "X" disease of peach and chokecherry. The meeting was arranged to afford an opportunity for interested phytopathologists and horticulturists to familiarize themselves with the disease and to gain the benefits to be derived from field visits and round-table discussions with men working on the disease. The presence of Professor E. M. Stoddard, who discovered the disease in Connecticut in 1933, was especially fortunate. The Columbia County Farm Bureau acted as host for the day's tour. Three round-table gatherings held the evening before, at noon during, and the evening following the tour, provided ample opportunity for discussions on all phases of this disease and its relation to other old and new virus diseases of stone fruits.

Those who attended were:

F. G. Anderson, Department of Agriculture, Anna, Ill.
H. W. Anderson, University of Illinois, Urbana, Ill.
L. C. Anderson, Geneva Experiment Station, Cleverack, N. Y.
C. A. Boyer, Department of Agriculture, Lansing, Mich.
A. B. Buchholz, Department of Agriculture and Markets, Albany, N.Y.
Donald Cation, Michigan State College, East Lansing, Mich.
Robert H. Daines, Agricultural Experiment Station, New Brunswick, N.J.

C. M. Haenseler, Agricultural Experiment Station, New Brunswick, N.J.
E. M. Hildebrand, Cornell University, Ithaca, N. Y.
S. L. Hopperstead, University of Delaware, Newark, Del.
Lee M. Hutchins, U. S. Bureau of Plant Industry, Beltsville, Md.
R. L. Klackle, Ilgenfritz Nursery, Monroe, Mich.
T. F. Manns, University of Delaware, Newark, Del.
W. D. Mills, Cornell University, Ithaca, N. Y.
D. H. Palmiter, Geneva Experiment Station, Poughkeepsie, N. Y.
W. H. Rankin, Department of Agriculture and Markets, White Plains, N. Y.
S. B. Shapley, Columbia County Agricultural Agent, Hudson, N. Y.
E. M. Stoddard, Agricultural Experiment Station, New Haven, Conn.
W. F. Turner, U. S. Bureau of Entomology and Plant Quarantine, Chattanooga, Tenn.
E. A. Walker, University of Maryland, College Park, Md.

(Department of Plant Pathology, Cornell University, Ithaca, New York).

INVITATION AND GREETING

An earnest invitation is extended to all our readers who may be in attendance at the meetings of the American Association for the Advancement of Science at Columbus, Ohio, to attend a Plant Disease Survey conference Wednesday, December 27, from 7:15 to 8:15 P.M., in the Junior Ballroom of the Neil House (Headquarters of the American Phytopathology Society). There will be a round-table discussion of nomenclature of phytopathogenic bacteria and viruses for the purpose of seeking uniformity in the records and publications of the Survey, and also of policies and plans for the projected revision of the check list of plant diseases.

We thank our collaborators and other friends for their helpful cooperation and interested good will. To all our readers, a Merry Christmas and a Happy New Year.

H. A. Edson

Freeman Weiss Nellie A. Brance

Paul R. Miller Mary L. Van Meter

Jessie D. Wood

Evelyn E. Bero